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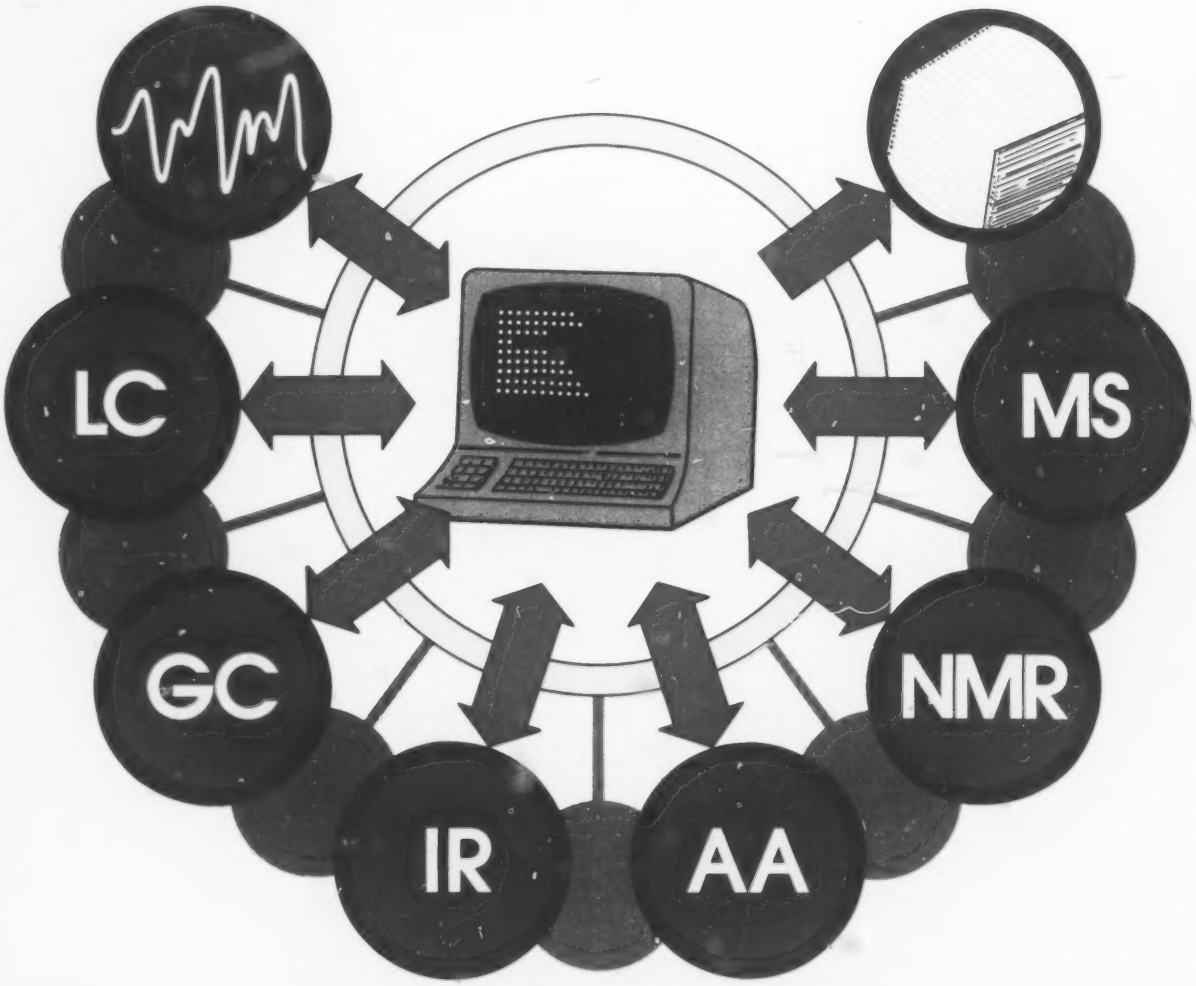
MARCH 19, 1984

CHEMICAL & ENGINEERING

Perkin Medal goes to Exxon's John Sinfelt
Page 25

NEWS



INSTRUMENTATION '84

Software gains prominence at Pittsburgh Conference

Page 31

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MARCH 19, 1984

News of the Week

■ **EPA administrator seeks aid of public in setting new standards for airborne particulates.** **Page 6**

■ **Union Carbide will buy subsidiaries of Katalistiks international, producers of fluid catalytic cracking catalysts.** **Page 7**

■ **Capital spending in the U.S. chemical industry forecast to rise 8% over 1983 level.** **Page 7**

■ **Research foundation leases drilling ship to study history and evolution of ocean basins.** **Page 7**

■ **House committee has no quarrel with research budget proposed by EPA.** **Page 8**

■ **CMA supports reauthorization of Superfund law, urging few changes, chairman says.** **Page 8**

Business

Biotechnology companies are beginning to use black ink on their earnings statements as products are commercialized. **Page 11**

International Business

Carbohydrate feedstocks used as fermentation media suffer from lack of interchangeability, low prices worldwide. **Page 12**

Government

Technical information policy toward Japan urged; Iran claims Iraqis are using chemical weapons in Persian Gulf war. **Page 15**

Science

Scientists attempting to aid Soviet dissident colleagues find that current boycott tactics are ineffective. **Page 22**

Perkin Medal

John H. Sinfelt, senior scientific adviser for Exxon, receives 1984 Perkin Medal for pioneer research in catalysis. **Page 25**

Books

"Chemistry and Crime" explores the scientific basis of crime detection used by protagonists in fictional whodunits. **Page 97**

ACS News

ACS task force studying chemistry education in the U.S. winds down, will present recommendations at St. Louis meeting. **Page 104**

Letters 4
Editor's Page 5

Concentrates
Business 10
Government 14
Science/Technology 20

The Departments
New Products 76
ACS Comment 103
People 106
Newscripts 120

Instrumentation '84

Computerization—from data stations to networks to LIMS—runs the modern analytical chemistry lab. **Page 31**

Union Carbide to buy large catalyst operation

Union Carbide has furthered its ambitious plans in the catalyst business with a major acquisition. The company has agreed to buy the U.S. and European subsidiaries of Katalistiks International, Baltimore, which produce fluid catalytic cracking (FCC) catalysts for petroleum refining. FCC is a process that cracks gas oil, which is similar to fuel oil, to lighter products while increasing content of octane-boosting aromatic and branched-chain hydrocarbons.

Worldwide sales for FCC catalysts are $500 million, according to H. F. Tomfohrde III, executive vice president and head of Carbide's engineering and technology services group. P. Kenerick Maher, president of Katalistiks International, estimates that the Amsterdam subsidiary has 33% of the European market for these catalysts and 14% of the U.S. market. The Savannah, Ga., plant of the U.S. subsidiary has a capacity of 130 million lb per year FCC catalysts, and the Delfzijl, Netherlands, plant of the Amsterdam subsidiary 55 million lb per year. Meanwhile, Carbide expects to complete a "tons-per-day" FCC catalyst plant in June as a part of expanding its Mobile, Ala., molecular sieves plant.

The worth of the acquisition is still subject to negotiations that may continue till the closing at the end of May, but it will be more than $100 million. Carbide will pay $15 million for assets, technology, and trademarks to each of the three owners of Katalistiks International, who are English China Clays, St. Austell, England; EKA of Göteborg, Sweden; and CRI International, Baltimore. In addition, Carbide will repay $62 million in Katalistiks debt, much of that owed to the three owners.

Tomfohrde says of the acquisition, "Our molecular sieve technology base, combined with Katalistiks' product technology, manufacturing facilities, and worldwide marketing capabilities will enable Union Carbide to enter FCC smoothly, quickly, and with worldwide impact." Tomfohrde adds that the acquisition is part of the firm's plan to become a leader in the $1 billion per-year world catalyst industry. Maher says that FCC catalysts based on Carbide's newest generation of molecular sieves will set a new standard of cracking capacity, stability, and selectivity in petroleum refining.

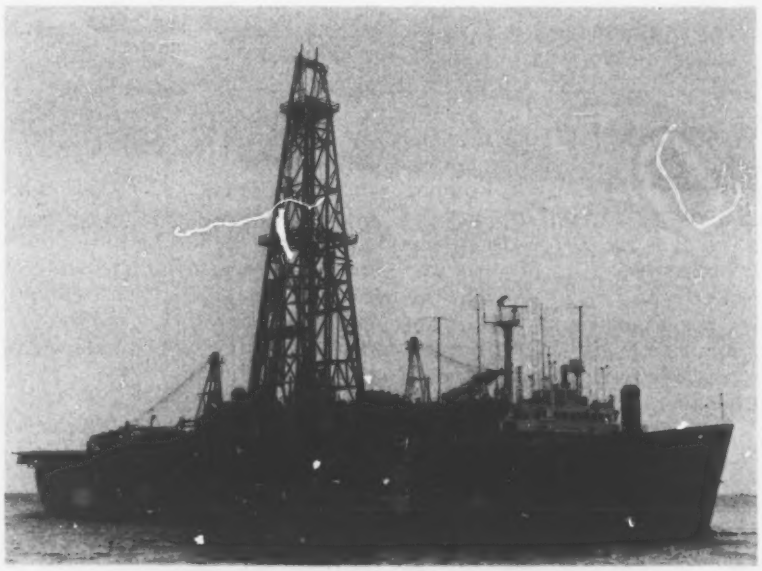
Katalistiks is a feisty new competitor in FCC catalysts. Other U.S. producers include the Davison division of W. R. Grace & Co., Engelhard Corp., and Harshaw/Filtrol. Katalistiks of Baltimore opened its doors in 1982, hiring many management, research, technical service, and sales people from competitors. The firm imported from the Delfzijl plant until 1983, when the Savannah plant started up. Drastic introductory price cuts secured toeholds in a half-dozen cracking units, and Katalistiks has deepened its penetration continuously since then. □

Upturn confirmed in chemical capital funds

Capital spending in the U.S. chemical industry is on a modest rise again after some very low years, according to recent surveys by the Department of Commerce and the Conference Board.

The Commerce Department's just-issued data show that capital spending this year in the U.S. for chemicals and allied products is forecast to rise 8.0% from 1983 to reach $14.34 billion. Last year's spending of $13.28 billion was essentially unchanged from 1982. Commerce's figure for this year is more optimistic than a few months ago, when it showed an increase of 6.3% in 1984.

Still, the Commerce Department's



Drilling ship leased for new sea-floor research project

Texas A&M Research Foundation has reached an agreement for long-term charter of the 470-foot drilling ship *SEDCO/BP 471*, above, to be the research vessel for a newly established oceanographic research project called the Ocean Drilling Program. The program, sponsored by the National Science Foundation and nine foreign countries, is the successor to the 17-year-long Deep Sea Drilling Project, which ended in 1983. Following some modification, the ship will drill various sites on the sea floor to study the history and evolution of the ocean basins, with the first scientific cruise scheduled for January 1985. The ship can accommodate 50 scientists and a crew of 52 and is owned jointly by SEDCO Inc. and British Petroleum. The project will be managed by Joint Oceanographic Institutions Inc., a consortium of 10 major oceanographic institutions. Texas A&M University is providing management support for the scientific research projects.

Appropriations are up, but actual spending still lags

$ Millions 1983[a]	Appropriations	Change from 1982	Spending	Change from 1982
First quarter	$ 1,874	−19%	$2328	−23%
Second quarter	2,371	4	2266	−20
Third quarter	2,964	30	2373	−13
Fourth quarter	2,878	11	2357	−11
TOTAL	$10,087	6%	$9324	−17%

a Plant and equipment in the U.S. for chemicals and products.
Source: Conference Board

forecast falls short of the 12% growth in U.S. capital spending expected by chemical companies in C&EN's survey at the end of last year. The same companies expected worldwide spending up more than 14% (C&EN, Dec. 12, 1983, page 10). The difference may arise because the Commerce Department's sample includes companies producing a wide range of chemical products, whereas the C&EN sample is made up mainly of basic chemical companies.

More evidence of a 1984 spending pickup comes from the New York City-based Conference Board in its quarterly report on capital appropriations (monies allocated, but not yet spent, for capital projects). The report shows that such appropriations for chemicals and allied products in the fourth quarter of 1983 reached $2.88 billion, an 11% increase over fourth-quarter 1982 but a drop of 2.9% from third-quarter 1983. For full-year 1983, capital appropriations totaled about $10.1 billion, a 6.4% increase over 1982.

Actual capital spending in the fourth quarter, according to the Conference Board, totaled $2.36 billion, down 11.4% from fourth-quarter 1982 and down 0.7% from third-quarter 1983. For the full year, capital spending in 1983 totaled $9.32 billion, a decline of 17% from the year before. □

House panel supports EPA R&D increase

Environmental Protection Agency Administrator William D. Ruckelshaus testified before the House Science & Technology Committee last week defending his fiscal 1985 budget proposal for research and development. The nearly 14% increase proposed for fiscal 1985 represents the first attempt to increase the R&D budget since 1981.

Rep. Don Fuqua's (D.-Fla.) committee praised Ruckelshaus' efforts to beef up research and expressed the hope that it was more than just a cosmetic improvement. As several committee members pointed out, the $278 million total for fiscal 1985 is still far less than the $350 million the agency requested for fiscal 1981. Ruckelshaus says that is kind of an apples and oranges comparison, pointing out that research priorities have changed since that time.

What is left of a large energy R&D budget, for instance, is a $34.4 million request for acid deposition work. Acid rain was probably the single most discussed issue at the hearing, as several Congressmen pointedly asked why nothing was being done. Ruckelshaus replied that there is as yet no consensus, either inside or outside Congress, about moving forward with controls to curb acid rain, and he cannot move until a consensus is reached. Until then, more research, particularly a large lake-monitoring program and the beginning of a forest-monitoring project, is planned.

Other areas of concern include alternatives to landfill disposal of hazardous wastes. EPA, it was said, has ordered the closing of non-approved sites, and some locales are being left without any way to get rid of wastes. Ethylene dibromide was mentioned as well, as Congressmen wondered if the agency had adequate research capability to screen pesticides, both new and existing, for toxic effects.

Rep. George E. Brown Jr. (D.-Calif.) put some persepctive on the proceedings, reminding Ruckelshaus that the committee had been through these same discussions—acid rain, hazardous wastes, pesticides—10 years ago and that the research to solve them still had not been done. Although he added he would be willing to give EPA another 10 years, he would like to see better progress made. □

CMA urges little change in Superfund

Chemical Manufacturers Association chairman Louis Fernandez told a House subcommittee that CMA strongly supports reauthorization of the law governing cleanup of abandoned hazardous waste sites. As he pointed out, "Whether it's fair or not, the chemical industry is bearing the brunt of public unhappiness on this issue. So there is no one more eager than we to make it yesterday's environmental problem."

Fernandez urges that the reauthorization follow what he terms a "formula for a robust, workable Superfund law." This would include determining realistically what the Environmental Protection Agency's annual funding needs are, and providing for them; deriving these funds from industry taxes that are much more broadly based than provided for in the current law; imposing these taxes for a five-year period so that needs can be examined periodically; and re-enacting the law unchanged in all other respects, particularly in dealing with the issue of public compensation for injury separately from that of site cleanup.

Although the law authorizing cleanup of abandoned hazardous waste dump sites doesn't expire for another year, the House Energy Subcommittee on Commerce, Transportation & Tourism already is considering two bills—one Democratic, H.R. 4813, and one Republican, H.R. 4915—that would both greatly expand the fund and make several other changes in the Superfund law.

Neither quite follows Hernandez's formula. He says both present certain fundamental problems. However, he adds that H.R. 4915 has a more workable approach in that it recognizes the need for a five-year reauthorization, it leaves the question of joint and several liability to the courts, and it recognizes the need for Congress to address the question of entitlements for chronic diseases separate from the process of reauthorization of a waste-site cleanup law. H.R. 4813, by contrast, is open-ended and makes provision for all of the things that H.R. 4915 doesn't. □

More Biotechnology Firms Making Money

The scene: A recent presentation to the New York Society of Security Analysts by the officers of a medium-sized biotechnology company. The president of the company is winding down the question and answer period.

President: Are there any other questions?

Analyst: Uh, when are you going to report some earnings?

President: (pause) No more questions? (pause) Well, thank you for coming.

A number of security analysts are calling 1984 the "year of transition" for U.S. biotechnology companies. They mean, in broad terms, that a sizable number of those companies will begin commercializing products this year. Specifically, they mean that many of them will begin reporting net income instead of net loss.

Analysts, whose laughter at what is now a stock biotechnology joke (see above) seems to be fading fast, would like that very much. They would like better guides than Ph.D. head counts, for instance, by which to separate the sheep from the goats. So they are taking some comfort from the biotechnology income statements for the final business quarter of 1983. There are more companies with profits than before.

For a group of 14 selected companies—representing a cross section of the genetic engineering, monoclonal antibodies, and biotechnology support (instrumentation and laboratory chemicals) segments—total revenues in the final quarter of calendar 1983 were some 70% higher than in the same period a year earlier. Even more significant, operating revenues (from product sales and contract research and development work) accounted for about 75% of the revenue in the 1983 period (for the nine firms that provided a revenue breakout). This means that firms are getting by less on interest earned by cash raised from public offerings, private placement, and other sources of capital, and more on their actual business activity.

There were some better reports on net income, as well. As a group, it is true, the companies still reported a large aggregate loss. But four of the firms had profits in the quarter, compared to just two the year before. That is a positive sign.

In the case of many of the firms with losing quarters, large revenue increases were overshadowed by increased commercialization costs: for product development, additions to marketing staffs and sales forces, construction of production facilities, and the like. Biogen's income, for instance, was cut sharply by the company's decision not to license completely its gamma interferon and interleukin-2, says chairman Walter Gilbert. This both eliminated license income and put the expense of clinical trials on Biogen.

"However, by reducing the involvement of licensees, we expect to generate higher revenues when these products reach the market," Gilbert explains.

The dilemma is one that most biotech firms have faced or will face eventually. Licensing provides ready cash, but it is not likely to generate sufficient income for long-term growth. Biotech chief executives know that marketing their own products is the way to better earnings. Genentech, for instance, hopes to have its first self-marketed product—human growth hormone—out this year.

"1984 is expected to be the final stage of our transition into a pharmaceutical company that not only develops and manufactures ethical drugs, but also markets products under its own label," comments Robert A. Swanson, Genentech president. "Depending on the timing of our human growth hormone marketing, this year may also see us begin to accelerate away from near-breakeven toward significantly greater earnings. Of course, 1984 would see only the modest beginnings of that trend."

David Webber, New York

Biotechnology revenues were up in fourth-quarter 1983

	FOURTH-QUARTER 1983					
	Operating revenue[a] ($ millions)	Total revenue	Operating revenue as % of total	Earnings[b] ($ millions)	Change from 1982 Revenue	Change from 1982 Earnings
Amgen	$0.90	$ 1.95	46%	$−0.97	596%	def
Applied Biosystems	na	4.27	na	0.74	231	1380%
Biogen	1.50	3.55	42	−6.08	20	def
California Biotechnology	na	1.82	na	0.08	467	nm
Centocor	na	2.39	na	−0.12	166	def
Cetus	8.05	10.63	76	0.29	75	nm
Collaborative Research	0.86	1.41	61	−0.99	21	def
Damon Biotech	0.42	1.09	39	−0.44	24	def
Genentech	na	13.46	90[c]	0.23	18	−87
Genex	na	4.70	na	−1.70	161	def
Molecular Genetics	1.63	1.94	84	−0.02	143	def
Monoclonal Antibodies	0.30	0.44	68	−1.00	144	def
Ribi ImmunoChem	0.11	0.18	61	−0.04	64	def
Vega Biotechnologies	na	0.73	na	−0.22	62	def

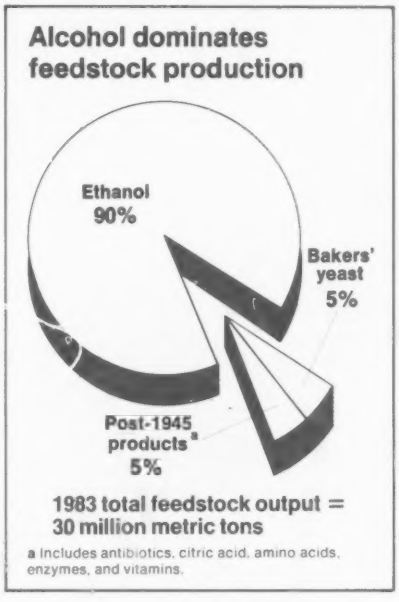
a Includes revenue from R&D contracts, product sales, and royalties, but excludes interest income. b Excludes extraordinary credits from federal income tax reductions for loss carry-forwards. c Revenue breakout was not public at press time, but company has estimated operating/total revenue ratio at 90%. def = deficit. na = not available. nm = not meaningful.

Problems Beset Carbohydrate Feedstocks

Petrochemical feedstocks are a well-known concept, but carbohydrates used as fermentation media also can be thought of as feedstocks. And just as with petrochemicals, there are problems of commodity products versus specialty media, lack of interchangeability, and dramatically low prices often set by the policies of government around the world.

Those are some of the conclusions of a new study on carbohydrate feedstocks for the fermentation industry by consultants Leo Hepner and Celia Male of L. Hepner & Associates in London.

Products made by fermentation are dominated by ethanol, which has been growing in importance over the past few years. That is particularly true as governments have emphasized and subsidized production of ethanol from native resources—for example, alcohol from cornstarch for formulating into gasohol. Ethanol, in fact, takes nearly 90% of carbohydrate feedstocks in the world market, or 27 million of a total 30 million metric tons of "as is" feedstocks. Fermentation of bakers' yeast demands another 5%, and what Hepner and Male term "post-1945" products the remainder.


Alcohol dominates feedstock production
Ethanol 90%
Bakers' yeast 5%
Post-1945 products[a] 5%
1983 total feedstock output = 30 million metric tons
a Includes antibiotics, citric acid, amino acids, enzymes, and vitamins.

It is that remainder of the market that the two consultants find most interesting—the now classic penicillin and other, more modern antibiotics, citric and other organic acids, amino acids, enzymes, vitamins, and others. The market for feedstocks for these products is now $300 million per year.

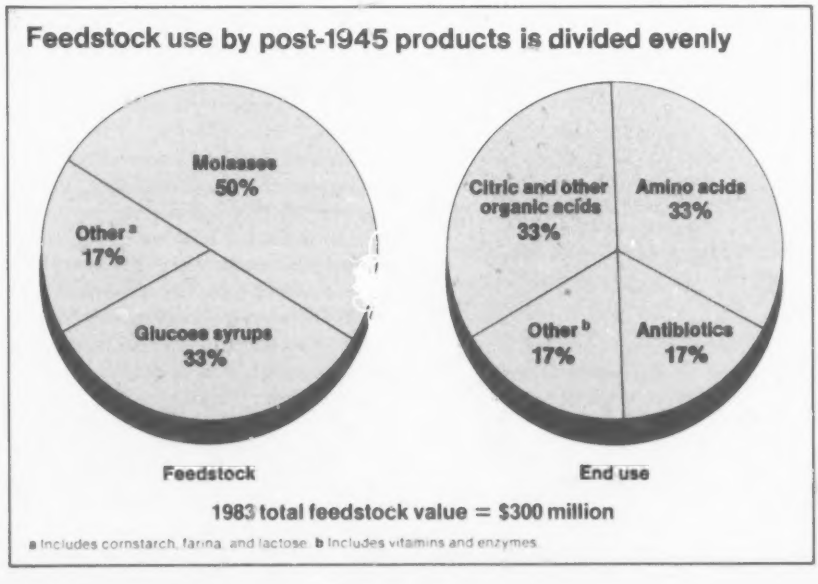
Molasses makes up half the carbohydrate feedstock for these modern specialties, glucose syrups a third, and all others—potato and corn starches, and lactose, among others—the remaining one sixth.

To some extent, companies that make fermentation products can switch among feedstocks. However, Hepner points out, in practice there are many difficulties. For one thing, microorganisms may be adapted or optimized for particular feedstocks. A change of feedstock could reduce productivity and lower the yields, thereby increasing costs until an optimum level is re-established. For many fermentations, a slow release of carbohydrate is important, so sugar would not be the most suitable substrate. And molasses—although a batch product that varies lot to lot, needing tight quality control and constant analysis—contains trace elements, vitamins, amino acids, and the like, which may play an important part in fermentation. If pure sugar were the feedstock, those extras would have to be added to the medium.

The goal, of course, is to maximize fermentation efficiency, and a system working well will be changed only after serious consideration. To some extent, the maximum is a biologically imposed restraint. For example, straight fermentation for primary metabolites probably reaches a maximum of about 30% conversion. For secondary metabolites, yields are much lower. Penicillin is probably about 35 g per L maximum, and some of the specialties, only about 1 g per L, if that.

Industry has shown increased attention over the past 10 years to waste products from fermentation. No matter how efficient the fermentation, "there is still slop in the tank afterwards," says Hepner. Companies no longer can discharge without pretreatment, and in some cases they have been denied expansion permits until they have suitable pretreatment plans.

Patricia Lavman, London


Feedstock use by post-1945 products is divided evenly
Molasses 50%
Other[a] 17%
Glucose syrups 33%
Feedstock
Citric and other organic acids 33%
Amino acids 33%
Other[b] 17%
Antibiotics 17%
End use
1983 total feedstock value = $300 million
a Includes cornstarch, farina, and lactose. b Includes vitamins and enzymes.